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| **Teacher: Ms. Conklin Unit: Conservation Efforts** **Aim: How can we successfully construct an aquaduct using capulary action?** |

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| **CCLS:**  CCSS.ELA-Literacy.RST.11-12.1  CCSS.ELA-Literacy.RST.11-12.8  CCSS.ELA-Literacy.WHST.11-12.1.c  **NGSS Science Standard**  Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. | |  |
| **Aim:**  **How can we successfully construct an aquaduct using capulary action?**  **Essential Question**  **How can humans transport resources using gravity and capulary action?** | |
| **Learning Objectives:**  SWBAT:  1. Construct a solution to transport water from a spring to a town.  2. Consider the environmental while constructing the aquaduct.  3. Identify and discuss the pros and cos of an aquaduct. | **3 pivotal questions**  1. Why might businesses want to invest in an aquaduct?  2. Describe some pros to the construction of an aquaduct  3. Explain some cons to the aquaduct, discuss your thinking.  4. What is capulary action and how does it apply to the construction of an aquaduct. |
| **Pre-Requisite Knowledge:**  Fresh, clean water is not in sufficient supply where large numbers of people live. Also, the amount of water on fertile land may not be enough to grow crops, or to sustain them through a drought. Aqueducts allow us to bring water from where it is plentiful to where it is useful. The city of Rome (Italy) constructed its first Roman aqueduct in 312bc: the Aqua Appia. New York City gets all its water fresh from upstate through major underground aqueducts. In short, for thousands of years,, aqueducts have been essential so that people in cities have fresh water and so that we can grow the crops to feed ourselves.  **Rationale for this lesson:**  Students who are in Ecology are exposed to environmental issues which also include the human element such as the need for water to survive. Constructing an aquaduct will give students the knowledge of the historical and environmental aspect of what it takes to find and construct a method to move water from one area to another. Students will also consider the environment in their construct and try to create an ecofriendly method to each part of the construction. This lesson is geared towards current issues in our society that require future solutions using science and engineering. | |
| **Do Now: 5 minutes**  Students will identify and discuss the importance of aquaducts and benefits of transporting water from a spring to a town.  Teacher will circulate and record answers on the board. | |
| **Procedure**/ **Sequence of the key learning objectives: 7 minutes**  Students will be paired in groups of 2. The following materials will be destributed:   * (2) straws * funnel * cup * tape * scissors   Students will be distributed a specific scenario which will determine the obstacles between the springs and town. Students will be asked to draft a composite sketch of how their aquaduct will be engineered.  **Construction/engineering: 15 minutes**  Students will work to build their aquaduct with provided materials. Desks can be used as “mountains.” Students will have (2) trials:  Trial 1: Water will be added to aquaduct. Students will have to fix/troubleshoot any holes, leaks, etc.  Trial 2: After modifying aquaducts and all issues have been assessed, water will be ran again to ensure a successful build.  **Note:** **7 minutes**  The starting point (spring) must always be higher than the points ahead of it. Students will make predictions if we connect multiple aquaducts and run it over a higher obstacle (ie. Student’s head). Students will record their predictions on their worksheets. This will lead into one of the laws of capillary action and gravity in relation to water.  **Summary/reflection: 7 minutes**  Students will complete their worksheets on the engineering of their aquaduct(s), focusing on obstacles, troubleshooting issues in the process, record their constructive reasoning and summarize their experience. | |
| **Summary Questions + Desired Response**  **Stick it to the door:** Students will use a post-it as a form of an exit slip and be asked to answer the following question:  State one benefit of having the ability of providing a town with spring water from great distances. | |
| **Assessment Method:**  **Formative**: \_\_\_ entrance slip \_\_\_ checklist \_\_\_ Web Quest  \_\_X\_ peer-assessment \_\_X\_ Construction & Engineering \_\_\_ conference w/teacher  \_X\_ exit slip (Stick it to the door)  **Summative**: \_\_\_ quiz \_\_\_ test X presentation \_\_\_ debate  \_\_\_ outline \_\_\_ draft X brief writing X rubric grade | |
| **Seating:** Groups of 2  **Grouped by**  - Current data (such as assessment results, classwork, formative assessments, etc.)  - Student needs  - Personality/strengths  **Rationale: Students will be put into groups based the following:**   * Current data (such as assessment results, classwork, formative assessments, etc.) * Student needs * Personality/strengths | |
| **Homework/Enrichment Activity**  Students will be given a map of NY State aquaducts and asked to answer the following questions   1. How many aquaducts supply water to New York City and what are the names of these Aquaducts that supply water to New York City 2. According to the map, where are our fresh water lakes? (Name all of the suppliy locations) | |
| **Domains of Knowledge (DOK)** | |